Recent Results of the Collective Thomson Scattering Diagnostic at TEXTOR

Korsholm, Søren Bang; Stejner Pedersen, Morten; Moseev, Dmitry; Bindslev, Henrik; Buerger, A.; Furtula, Vedran; Leipold, Frank; Meo, Fernando; Michelsen, Poul; Nielsen, Stefan Kragh

Total number of authors:
14

Published in:
Proceedings

Publication date:
2009

Document Version
Publisher's PDF, also known as Version of record

Recent results of the collective Thomson scattering diagnostic at TEXTOR

S.B. Korsholm[1], M. Stejner[1], D. Moseev[1], S.K. Nielsen[1], H. Bindslev[1], F. Leipold[1], F. Meo[1], P. K. Michelsen[1], M. Salewski[1], A.Buerger[2], E. Westerhof[2], P. Woskov[3] and the TEXTOR team[4].

[1] *Association EURATOM-Risø DTU, Risø National Laboratory for Sustainable Energy, Technical University of Denmark, P.O. Box 49, DK-4000 Roskilde, Denmark*

[2] *FOM-Institute for plasma Physics Rijnhuizen, Association EURATOM-FOM, Trilateral Euregio Cluster, Nieuwegein, The Netherlands, www.rijnhuizen.nl*

[3] *MIT Plasma Science and Fusion Center, Cambridge, MA 02139*

[4] *Institute for Energy Research - Plasma Physics, Forschungszentrum Juelich, Association EURATOM-FZJ, Trilateral Euregio Cluster, 52425 Juelich, Germany*

The technique of collective Thomson scattering (CTS) is versatile and has the potential of determining several important plasma parameters. The CTS diagnostic installed at TEXTOR is primarily aimed at diagnosing the dynamics of confined fast ions, and results of first measurements of the CTS diagnostic at TEXTOR have been reported. These results include temporally and spatially resolved measurements of the 1D velocity distribution function of the confined fast ions; which is obtained by observing the scattered radiation resulting from the interaction between microscopic collective fluctuations in the plasma and injected powerful mm-wave radiation.

Recently, the issues of fuelling and fuelling diagnostics have been receiving increasing attention. As CTS also offers the possibility of measuring the fuel ion ratio, efforts to develop a proof-of-principle CTS fuel ion ratio diagnostic have been initiated. At geometries resolving the dynamics perpendicular to the magnetic field, the bulk ion feature of the CTS spectrum is modulated by ion Bernstein waves. The spectrum of the ion Bernstein waves is determined by the cyclotron frequencies and their harmonics of the different ion species in the plasma, and since the weights of the different contributions are related to the densities of the given species, it is possible to infer an isotope or fuel ion ratio.

This contribution will give an overview of the recent experiments and results of the CTS diagnostic at TEXTOR and reviews the potential of using CTS as a diagnostic for determining the fuel ion ratio.